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Perception and Concerns of University Students about the Change to the Online or Virtual Modality by the COVID-19

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Abstract. In this study we analyze the characteristics of groups of students based on their perception of the online or virtual modality, situations that concern them in the face of confinement and the change of modality from face to online or virtual. The study was carried out in a university in southern Mexico, and an electronic link was sent to them to answer a questionnaire made in Google Forms. The sample is composed of 73 undergraduate students in the area of technology. The K-means algorithm was used using the Weka software. As a result, three clusters were obtained; cluster 1 indicated that they were almost always concerned about many aspects, evaluations, understanding of the topics, and the demands of the professor, among others. Likewise, cluster 3 presented similarities with cluster 1, although it was integrated by women mostly at the graduate level, what always worried them was the stability of the internet connection, on the contrary, in cluster 2 there was a minimum level of concern in general, since they indicate that they are rarely concerned about the exams, the clarity of the instructions, and the time of delivery of the activities.

Keywords: COVID-19, online classes, students, clustering, perception.

1 Introduction

On March 11, 2020, COVID-19 was declared a pandemic by the World Health Organization (WHO) [1], and countries implemented containment as a measure to prevent infection. On March 24, 2020, Mexico declared its agreement on measures to prevent and control the spread of COVID-19.

With the mandatory confinement by the COVID-19, face-to-face classes were suspended and educational institutions of all levels, implemented the use of educational platforms, video conferencing, email, instant messaging applications, social networks as tools that help the continuity of the activities of the school year under the online or

virtual mode, it was an abrupt change for all involved in the learning process: teachers, students and academic administration.

The change from face-to-face to online or virtual mode requires Information and Communication Technologies (ICT) and an instructional design that specifies student learning activities.

González et al [3] conducted an investigation to determine the effect of containment on the academic performance of university students and considered two stages to measure the effect of containment, the first corresponding to the period 2019/2020, and the second stage corresponding to the period of containment of COVID-19. They conclude that confinement changed students' learning strategies and improved their performance.

Díaz et al. [4] conducted an investigation to find out how university students have experienced confinement by COVID-19 as measured by the variables of life satisfaction, resilience and social capital.

Demuyakor [5] conducted an assessment of Ghanaian international students in China to find out the level of satisfaction of online learning in higher education institutions in dealing with these new initiatives. The results of the study indicate that students support this initiative. It was also found that the cost of participating in online learning is high, that they spend a lot on buying data from the Internet, and that connection is slow.

The objective of the study is to conduct an analysis of students' perception of the online or virtual class modality and the concerns generated by the change of modality and confinement by COVID-19.

1.1 Proposed Materials and Methods

1.2 Description of the Data

This analysis shows results of variables related to students' perception of the change in study mode from face-to-face to online. The variables present information about the issues that concern them such as evaluation, time of delivery of the designed activities, clarity of instructions, teachers' demands, stability of the connection, among others.

A total of 73 technology students from a sample population of a computer science faculty at a university in southern Mexico participated in this study. The sample selected was non-probabilistic [6], given the circumstances.

The questionnaire was applied online to students who were anonymously or voluntarily enrolled in the school year from February to August 2020.

1.3 Student Perception Questionnaire About Online Classes

The questionnaire includes a series of questions about students' opinions and concerns about online study. In Table 1 you can see the items that made up the questionnaire, whose answers corresponded to a Likert scale.

Table 1. Questionnaire items.

n	Item	Variable
1	Programa	I1
2	Sex	I2
3	Cycle	I3
4	Subjects enrolled last cycle	I4
5	Online requires greater dedication to subject preparation	I5
6	Online I learn more	I6
7	Teachers student opinion on methodology and evaluation	I7
8	Teachers availability of internet and computer equipment	I8
9	Concerned about competition with group mates	I9
10	The personality and character of the teacher was a concern	I10
11	Concerned about the evaluation of the subjects	I11
12	Concerned about online testing	I12
13	Concerned about the delivery time of the activities	I13
14	Concerned understanding of the topics addressed in classes	I14
15	Concerns about clarity of instructions in the activities	I15
16	Concerns about teacher response times	I16
17	Concerns about the availability of class materials	I17
18	The level of demand from teachers was a concern	I18
19	Concerned that the teacher's teaching is too theoretical	I19
20	Concerned about the stability of the internet connection	I20
21	Concerned about participation in the class through chat	I21
22	Concerned about participation in the class through the microphone	I22
23	Concerns about participation in the camera-lit class	I23
24	Concerned preparation of teachers in the handling of technology	I24
25	Activities you do to distract yourself	I25

1.4 Data Mining Technique: Clustering

Clustering is an automatic data classification task, it consists in dividing the data objects (patterns, entities, instances, observations, units) into a certain number of groupings (groups, subsets or categories), in these groups the data objects in the same clusters should be similar to each other, while the data objects in different clusters should be different from each other [7].

2 Results

For the study a sample integrated by a population of 73 students was used, 23 women and 50 men, the educational programs considered were seven, in the population there are 20 students of Engineering in Computer Systems (ISC), a total of 13 students of Licentiate in Computer Systems (LSC), of Administrative Computer Engineering (IIA) 9 students, of Bachelor's Degree in Information Technology (LTI) 8 students, of

Bachelor's Degree in Administrative Computer Science (LIA) 5 students, of Bachelor's Degree in Telematics (LT) a total of 4, and of the Master's Degree in Technologies for Learning and Knowledge (MTAC) 14 students.

The k-means algorithm was implemented using the Weka data mining software. The results are shown in Table 2.

In cluster 1 the students of the ISC academic program were identified, in total 33, integrated mostly by male students of 7 cycle that enrolled 5 subjects. In terms of their perceptions the students fully agree that online subjects require more dedication, they neither agree nor disagree with the statement that more is learned online. As for the opinion that teachers take students into account when designing the methodology and evaluating the subject, they agree. They also agree with the statement that teachers consider the availability of internet and computer equipment to students.

As for concerns regarding interaction in online classes, students in this group express that they rarely worry about competition between classmates, they are almost always concerned about: the character of the teacher, the evaluation of the subject, online tests, the time of de- livery of activities, the understanding of the topics covered in class, the clarity of instructions in the activities to be developed, the response times of the teacher, the avail- ability of materials in class, the level of demand of the teacher, the very theoretical teaching of the topics, the participation through chat. Among the main concerns that always arise in this group of students is the stability of the internet connection, participation in class through the microphone, participation in class with the camera on. Finally, they are rarely concerned about the teacher's preparation in terms of handling the technology. Among the activities they do to distract themselves from these concerns are exercising, surfing the net, playing video games, and reading a book.

In cluster 2, the students of the ISC academic program were identified, in total 23, integrated mostly by male students of 7 cycle who enrolled 5 subjects. Students' perceptions indicate that they agree that online subjects require more dedication, disagreeing with the statement that more is learned online. As for the opinion that teachers take students into account when designing the methodology and evaluating the subject, they agree. They also disagree with the statement that teachers consider the availability of internet and computer equipment to students.

As for concerns regarding interaction in online classes, students in this group express that they are rarely concerned: competition among group peers, the character of the teacher, the evaluation of the subject, the online exams, the time of delivery of the activities, the understanding of the topics covered in class, the clarity of the instructions in the activities to be developed, the response times of the teacher, the availability of materials in class, the level of demand of the teacher, the very theoretical teaching of the topics, the participation through the chat, the stability of the internet connection, the participation in class through the microphone, the participation in class with the camera on, the preparation of the teacher in terms of the handling of the technology. Finally, among the activities they do to distract themselves, they stand out, surfing the net and playing video games. In cluster 3 the students of the MTAC academic program were identified, in total 19, composed mostly of female 4th cycle students who enrolled in 5 subjects.

Table 2. Characteristics of the clusters obtained.

Variables	Cluster 1 (33)	Cluster 2 (23)	Cluster 2 (19)
I1	ISC	ISC	MTAC
I2	7.2	6.6	4
I3	Male	Male	Female
I4	5.40	5.47	5.52
I5	I totally agree	All right	All right
I6	Neither agree nor disagree	Disagreeing	Disagreeing
I7	All right.	All right	Neither agree nor disagree
I8	All right.	Disagreeing	All right
I9	Rarely	Rarely	Rarely
I10	Almost always	Rarely	Almost always
I11	Almost always	Rarely	Always
I12	Almost always	Rarely	Almost always
I13	Almost always	Rarely	Almost always
I14	Almost always	Rarely	Almost always
I15	Almost always	Rarely	Almost always
I16	Almost always	Rarely	Almost always
I17	Almost always	Rarely	Almost always
I18	Almost always	Rarely	Almost always
I19	Almost always	Rarely	Rarely
I20	Always	Rarely	Always
I21	Almost always	Rarely	Almost always
I22	Always	Rarely	Almost always
I23	Always	Rarely	Rarely
I24	Rarely	Rarely	Hardly ever
I25	Exercise, Surfing the Net, Playing Video Games, Reading a Book	Surfing the Net, Playing Video Games	Listening to music, Exercising, Surfing the net, Reading a book

Students' perceptions indicate that they agree that online subjects require more dedication, disagreeing with the statement that more is learned online. As for the opinion that teachers take students into account for the design of the methodology and evaluation of the subject, they neither agree nor disagree. They also agree with the statement that teachers consider the availability of internet and computer equipment to students.

As for concerns regarding interaction in online classes, students in this group express that they rarely worry about competition among classmates.

On the other hand, they are almost always concerned about the character of the teacher, online tests, time spent on activities, understanding of the topics covered in class, clarity of instructions in the activities to be developed, teacher response times, availability of materials in class, teacher's level of demand, participation through chat, participation in class through the microphone. Rarely do they consider the very theoretical teaching of the topics and the participation in the class with the camera on a

concern. They almost never worry about the preparation of the teachers in the handling of the technology. This group of students relax by listening to music, exercising, surfing the net, and reading a book.

3 Conclusions

This analysis shows us a general panorama about the perceptions of the students based on their experience of studies in the online modality, in the previous semester February-August 2020, this was a change that was not planned, although for being a faculty in technologies they were not affected by the handling of this type of online platforms, but they did show concerns in certain aspects. To obtain the results, the data mining technique called clustering was used.

The algorithm used was the k-means, available in the Weka software. Cluster 1 showed almost always concern about many aspects, evaluations, understanding of the topics, teacher's demands among others, likewise cluster 3 presented similarities with group 1, although integrated by women mostly and graduate level, what always worried them was the stability of the internet connection, on the contrary in cluster 2 there was a minimum level of concern in general, since they indicate that they rarely worry about the exams, the clarity of the instructions, the deli- very time of the activities.

It is planned to use other data analysis techniques to learn more about these data, as well as data visualization techniques for easy interpretation of results.

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